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Review of Tersilochinae (Hymenoptera, Ichneumonidae) of China, with descriptions of four new species

Andrey I. Khalaim[1, †], Mao-Ling Sheng[2, ‡]

1 *Zoological Institute, Russian Academy of Sciences, Universitetskaya nab. 1, St.Petersburg 199034, Russia. División de Estudios de Postgrado e Investigación, UAM Agronomía y Ciencias, Universidad Autónoma de Tamaulipas, Cd. Victoria 87149, México* **2** *General Station of Forest Pest Management, The State Forestry Administration, 58, Huanghe North Street, Shenyang 110034, P.R. China*

† *urn:lsid:zoobank.org:author:ACF2AF20-5723-4507-AABB-CC7445B7A44A*
‡ *urn:lsid:zoobank.org:author:3C0EBDB7-26F7-469B-8DB1-5C7B1C6D9B89*

Corresponding author: *Andrey I. Khalaim* (ptera@mail.ru)

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Abstract

General data on distribution and available host records are provided for the seventeen known Chinese species of Tersilochinae, distributed in five genera. Four species, *Diaparsis* (*Diaparsis*) *nitidulentis* **sp. n.**, *Probles* (*Euporizon*) *vulnificus* **sp. n.**, *Tersilochus* (*Tersilochus*) *ningxiator* **sp. n**. and *T.* (*T.*) *runatus* **sp. n.**, are described from Ningxia Hui Autonomous Region of China. *Diaparsis rara* Horstmann and the subgenus *Rugodiaparsis* Horstmann of the genus *Probles* Förster are recorded from China for the first time.

Keywords

China, Hymenoptera, Ichneumonidae, Tersilochinae, new species, taxonomy

Introduction

Tersilochinae is a medium-sized cosmopolitan subfamily that includes 21 genera with about 280 described species (Yu et al. 2005, Khalaim, personal data). Only the Palaearctic fauna of this subfamily has been studied moderately well (Horstmann 1971,

1981, Khalaim 2002a,b, 2003, 2004a,b, 2005, 2007, 2008, Khalaim et al. 2009), and now comprises 234 species (over 80% of the known world fauna) in 13 genera. The majority of non-Palaearctic species are still undescribed. A quantity of undescribed taxa of Tersilochinae are known from the Nearctic, Australasian, Afrotropical (=Ethiopian) and Oriental regions (Townes 1971, Gauld 1984, Khalaim, personal data).

Most tersilochines are koinobiont endoparasitoids which oviposit into the host larva and kill the host in its pupation chamber. They are commonly reared from coleopteran hosts, especially the family Curculionidae, though orders Hymenoptera and Lepidoptera sometimes also serve as hosts. For instance, species of the genus *Gelaens* Horstmann are common parasitoids of Xyelidae in male cones on pines (Blank and Khalaim, unpublished), some tersilochine species were reported from sawflies of the family Tenthredinidae (Hellén 1958, Kopelke 1994, Al-Saffar and Aldrich 1997), and two species of Tersilochus were reared from Eriocraniidae (Lepidoptera) (Jordan 1998).

The objectives of this work are to study material of Tersilochinae collected by Dr. M.-L. Sheng in Ningxia Hui Autonomous Region of China, summarize data on Chinese tersilochines described in many separate papers, including papers which are not referenced in the catalogue TaxaPad (Yu et al. 2005), and present a general taxonomic review of Chinese Tersilochinae. A key to all species of Tersilochinae of Southeast Asia, with descriptions of new taxa, will be provided by Khalaim (unpublished).

Methods

Forty specimens of Tersilochinae were studied, collected from July to September 2005 by Dr. M.-L. Sheng in Liupanshan at 1820 m above sea level, in Ningxia Hui Autonomous Region, Palaearctic part of China. The taxonomy is as accepted in the catalogue TaxaPad (Yu et al. 2005). Morphological terminology used in the descriptions predominantly follows Townes (1969). Photos were taken with a Leica MZ16 stereomicroscope with integrated Leica photo camera in the Zoological Institute of the Russian Academy of Sciences (St. Petersburg, Russia). The captured images were assembled with Helicon Focus software and edited in Adobe Photoshop CS2. Types of new species are deposited in the collections of General Station of Forest Pest Management, State Forestry Administration, P.R. China (GSFPM) and Zoological Institute RAS, St. Petersburg, Russia (ZISP).

Results and taxonomy

Twelve species of Tersilochinae from five genera, *Barycnemis*, *Diaparsis*, *Phradis*, *Probles* and *Tersilochus*, were recorded from China hitherto. The genus *Diaparsis* occurs in all zoogeographical regions, while the other four genera have a predominantly Holarctic distribution (Townes 1971, Khalaim, personal data). Only three species, *Diaparsis isfiriae* Khalaim, *D. saeva* Khalaim and *Tersilochus orientalis* (Uchida), were recorded from the Oriental part of China, with the remaining records from the Palaearctic part of China.

Four species, *Diaparsis* (*Diaparsis*) *nitidulentis* sp. n., *Probles* (*Euporizon*) *vulnificus* sp. n., *Tersilochus* (*Tersilochus*) *ningxiator* sp. n. and *T.* (*T.*) *runatus* sp. n., are described from the Palaearctic part of China in this paper. One species, *Diaparsis rara* Horstmann, and the subgenus *Rugodiaparsis* Horstmann of the genus *Probles* Förster, with one undetermined species, are recorded for the first time from China. A list of seventeen Chinese species of Tersilochinae with general data on distribution and host records is presented below.

Barycnemis funiuensis Sheng, 2002

Distribution. China (Henan: 33°39' N, 111°49' E, 1400 m).

Barycnemis tibetica Khalaim, 2004a

Distribution. China (Eastern Tibet).

Diaparsis (Diaparsis) isfiriae Khalaim, 2008

Distribution. South China (Yunnan: Lugu lake, Luo Shui, 27°45' N, 100°45' E).

Diaparsis (Diaparsis) minquanensis Sheng & Wu, 1999 in Sheng et al. 1999

Distribution. China (Henan: 34°33' N, 115°18' E).

Biology. Parasitoid of *Lema decempunctata* Gebler (Coleoptera: Chrysomelidae) (Sheng et al. 1999).

Diaparsis (Diaparsis) multiplicator Aubert, 1969

Distribution. Europe (Horstmann 1971, Khalaim 2005), China (Liaoning: 41°51' N, 123°25' E) (Sheng et al. 1999).

Biology. Parasitoid of *Curculio villosus* F. (Coleoptera: Curculionidae) in Europe (Horstmann 1981).

Diaparsis (Diaparsis) niphadoctona He, 1995 in He and Li 1995

Distribution. China (Gansu).

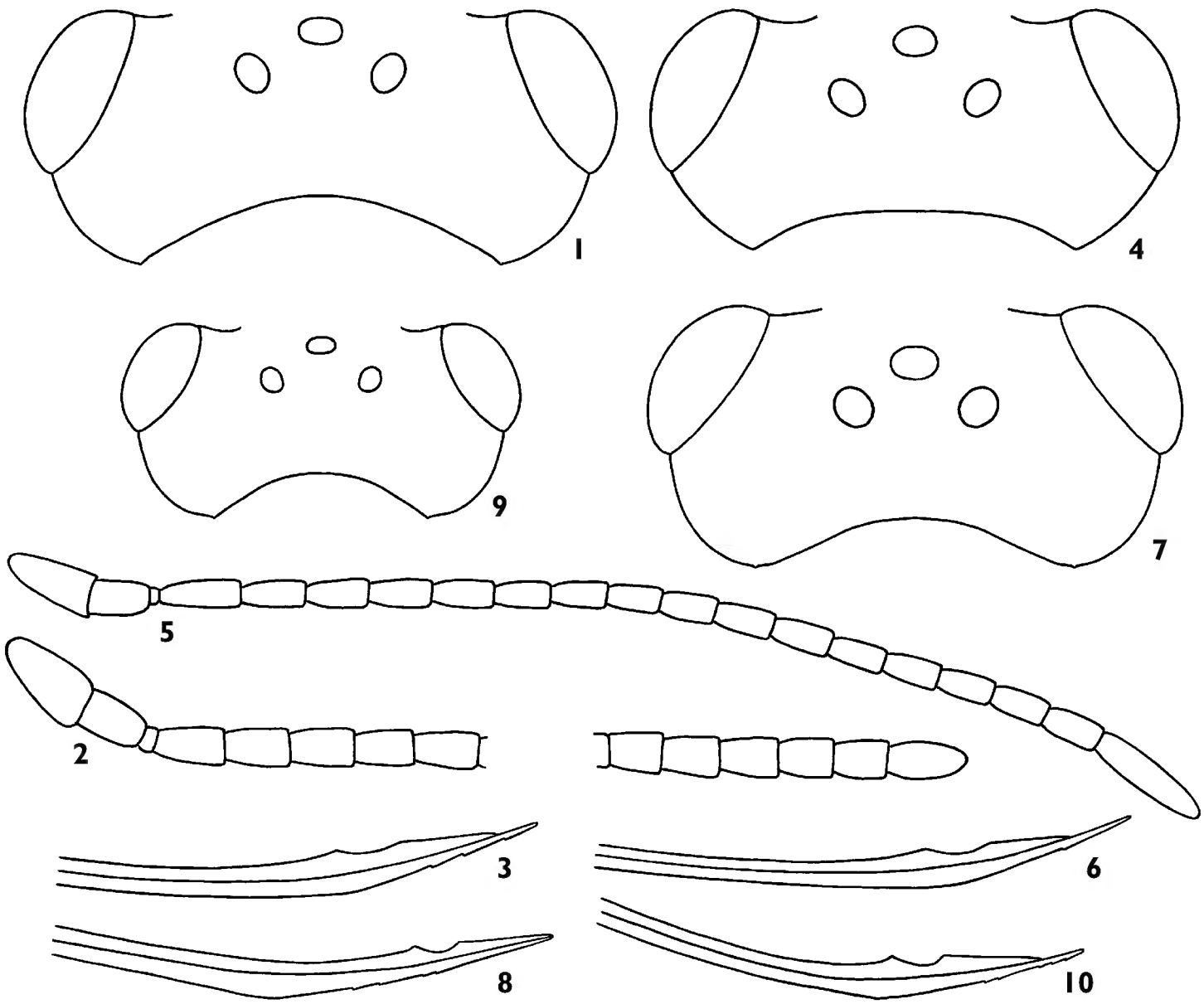
Biology. Parasitoid of *Niphades castanea* Chao (Coleoptera: Curculionidae) (He and Li 1995).

***Diaparsis (Diaparsis) nitidulentis* Khalaim & Sheng, sp. n.**
urn:lsid:zoobank.org:act:52526EBE-F980-4A86-B37E-783699E4C9B8
Figs 1-3, 11-14

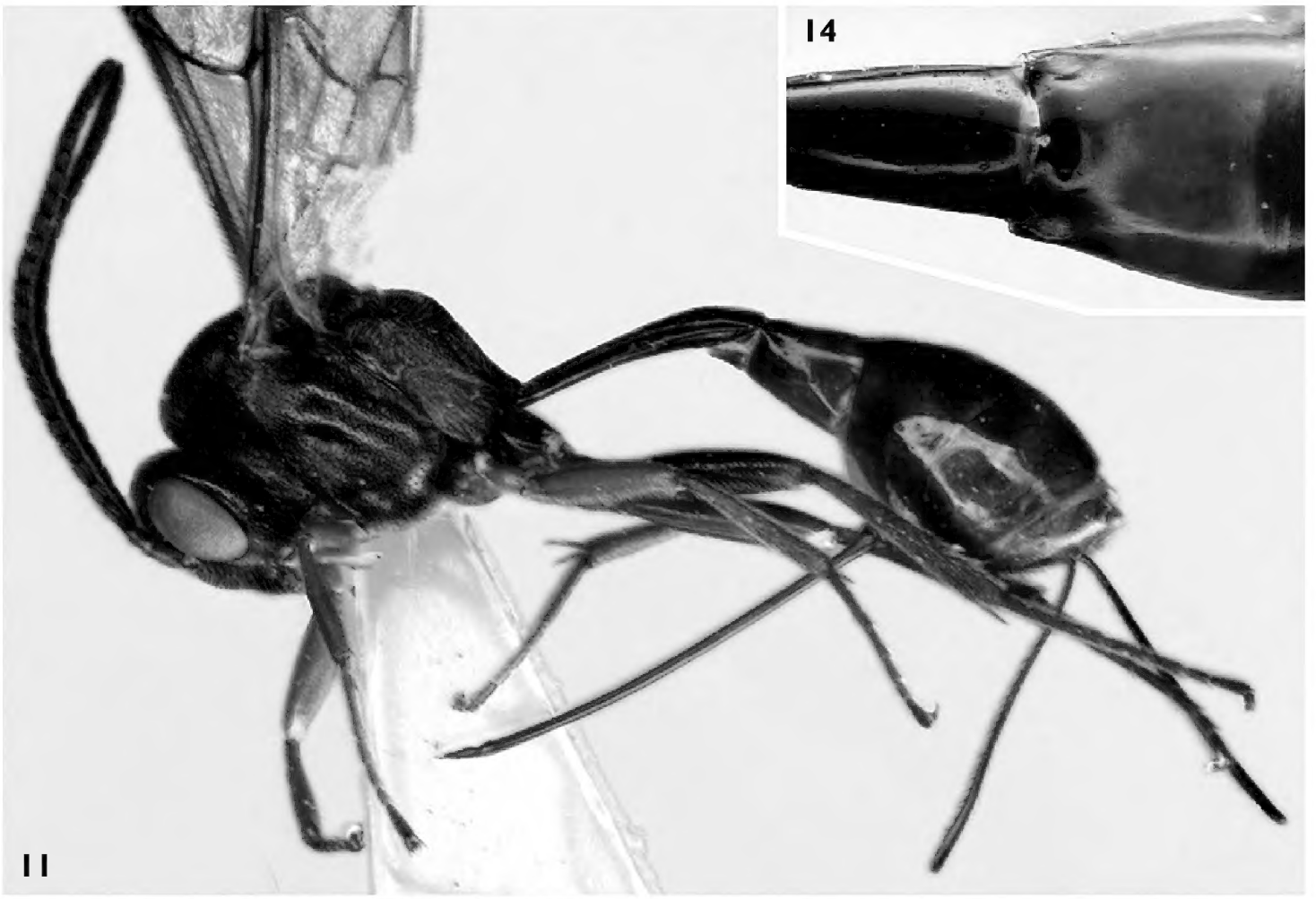
Diagnosis. In the key to Palaearctic species of the subgenus *Diaparsis* s. str. (Khalaim 2005), *D. nitidulentis* sp. n. runs to *D. nitida* Horstmann at couplet 22. The new species may be distinguished from this species by the slender flagellomeres (Fig. 2), weaker sternaulus (Fig. 12), longer ovipositor sheath (Fig. 11), and the shape of the ovipositor (Fig. 3).

Description. Female. Body length 4.7 mm.

Head roundly narrowed behind eyes in dorsal view (Fig. 1), temple 0.68 times as long as eye width (Fig. 1). Flagellum of antenna with 21-22 segments; all flagellomeres, excepting the first and apical ones, distinctly elongate, 1.3-1.5 times as long as wide (Fig. 2). Mandible mostly punctate, upper tooth distinctly longer



Figures 1-10. Tersilochinae spp., ♀♀, holotypes. *Diaparsis nitidulentis* sp. n. **1** head, dorsal view; **2** apex and base of antenna, lateral view; **3** apex of ovipositor, lateral view. *Probles vulnificus* sp. n.; **4** head, dorsal view; **5** antenna, lateral view; **6** apex of ovipositor, lateral view. *Tersilochus ningxiator* sp. n.; **7** head, dorsal view; **8** apex of ovipositor, lateral view. *Tersilochus runatus* sp. n.; **9** head, dorsal view; **10** apex of ovipositor, lateral view.



Figures 11-14. *Diaparsis nitidulentis* sp. n., ♀, holotype. **11** general habitus (without wings); **12** mesosoma, postero-lateral view; **13** propodeum, dorsal view; **14** tergites 1-2, dorsal view.

than lower tooth. Malar space about as long as basal width of mandible. Occipital carina slightly raised in its lower part, after the juncture with oral carina. Clypeus broad, weakly and evenly convex, smooth, distinctly punctate in its upper 0.6. Face and frons finely granulate and densely punctate. Vertex almost smooth, rather densely pubescent. Temple finely and sparsely punctate, smooth and shining.

Mesoscutum finely granulate and very densely punctate. Sternaulus as moderately depressed oblique area, transversely wrinkled (Fig. 12). Mesopleuron distinctly punctate centrally, with finer and denser punctures peripherally, smooth between punc-

tures, with smooth impunctate area above sternaulus (Fig. 12). Mesosternum distinctly punctate, smooth between punctures. Basal keel of propodeum well developed, 0.41-0.46 times as long as apical area (Fig. 13). Spiracle separate from pleural carina by two diameters of spiracle. Dorsolateral area of propodeum finely granulate, distinctly punctate. Apical area punctato-rugulose, weakly pointed anteriorly (at angle of about 85°) (Fig. 13).

Fore wing length 3.65 mm. First section of radial vein longer than width of pterostigma. Metacarp not reaching apex of fore wing. Second recurrent vein postfurcal, unpigmented in its anterior part. Nervellus of hind wing weakly reclivous. Tarsal claws not pectinate.

First tergite length 1.14, posterior width 0.27 mm; tergite very slender, round in transverse section, entirely smooth. Glymma small, round, with short furrow anteriorly, not joined by a furrow to ventral part of postpetiole. Thyridia about twice as long as wide (Fig. 14). Second tergite length 0.45 mm. Ovipositor upcurved, with two dorsal subapical teeth, and three fine teeth ventrally (Fig. 3); sheath 1.57 mm long, about 1.4 times as long as first tergite (Fig. 11).

Coloration. Body black. Palpi, mandible (excepting teeth), lower 1/3 of clypeus, scape and pedicel of antenna ventrally and legs brownish yellow to yellow-brown. Coxae more or less darkened; fore coxa brownish yellow to brownish; mid and hind coxae brownish to dark brown, yellowish ventrally. Hind femur mostly brown, yellow-brown basally, apically and ventrally. Hind tibia and all tarsi usually slightly infuscate. Tegula and pterostigma dark brown. Metasoma behind first segment mostly yellow-brown, darkened dorsally.

Male unknown.

Type material. Holotype female, China, Ningxia Hui Autonomous Region, Liupanshan, 35°24' N, 106°23' E, 1820 m, 15.IX.2005, coll. M.-L. Sheng (GSFPM). Paratype. Data as in holotype, but 25.VIII.2005, 1 ♀ (ZISP).

Etymology. From the Latin nitidus (bright, shining).

Diaparsis (Diaparsis) rara Horstmann, 1971

Material examined. China, Ningxia Hui Autonomous Region, Liupanshan, 35°24' N, 106°23' E, 1820 m, 7-28.VII.2005, coll. M.-L. Sheng, 4 ♀♀, 1 ♂.

Distribution. Transpalaearctic species (Khalaim 2005): Europe, Caucasus, Kazakhstan, Russian South Siberia and Far East, China (Ningxia). First record from China.

Diaparsis (Diaparsis) isfiriae Khalaim, 2008

Distribution. South China (Yunnan: 35 km N Lijiang, 27°13' N, 100°19' E).

? Phradis gibbus Holmgren, 1860

Distribution. Probably Transpalaearctic species: Europe and south of Russian Far East (Khalaim 2007), China (Shanxi) (Chao 1976).

Phradis sp.

Material examined. China, Ningxia Hui Autonomous Region, Liupanshan, 35°24' N, 106°23' E, 1820 m, 7.VII.2005, coll. M.-L. Sheng, 1 ♂.

Probles (Euporizon) vulnificus Khalaim & Sheng, sp. n.

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Figs 4-6, 15-20

Diagnosis. The new species resembles the European *P. brevicornis* Horstmann in that both species have the temple short (Fig. 4), thyridia slightly elongate (Fig. 19), and the ovipositor sheath distinctly shorter than the first tergite (Fig. 18). But *P. vulnificus* sp. n. may be recognised by the very slender flagellomeres (Fig. 5), and the longer body (about 4.0 mm in *P. vulnificus* sp. n. and about 3.0 mm in *P. brevicornis*). The new species also differs from *P. brevicauda* Horstmann by the shorter temple (Fig. 4) and entirely yellow-brown legs.

Description. Female. Body length 4.15 mm.

Head strongly and rather linearly narrowed behind eyes in dorsal view (Fig. 4), temple 0.62 times as long as eye width (Fig. 4). Flagellum of antenna with 17 segments, filiform; all flagellomeres, except the basal and apical ones, 1.8-2.0 times as long as wide (Fig. 5). Upper tooth of mandible distinctly longer than lower tooth. Malar space half as long as basal width of mandible. Oral carina strong, distinctly raised after juncture with occipital carina. Clypeus weakly and evenly convex, almost entirely smooth, with fine, sparse punctures in upper half. Face, frons and vertex distinctly granulate, without distinct punctures. Temple with more shallow granulation, very finely punctate.

Mesoscutum granulate and rather densely punctate. Sternaulus long, crenulate, upcurved anteriorly (Fig. 16). Mesopleuron finely granulate to smooth, more or less densely punctate, smooth and impunctate above sternaulus, punctate-rugulose in upper anterior corner of mesopleuron (Fig. 16). Basal area of propodeum indistinct, with strong longitudinal wrinkles, 0.43 times as long as apical area (Fig. 17). Propodeal spiracle separate from pleural carina by about 1.5 diameters of spiracle. Dorsolateral area of propodeum finely granulate, sparsely and finely punctate; apical area uneven to rugulose.

Fore wing length 3.25 mm. First section of radial vein longer than width of pterostigma. Metacarp almost reaching apex of fore wing. Second recurrent vein postfurcal, unpigmented in its anterior part. Nervellus of hind wing weakly reclivous. Tarsal claws not pectinate.

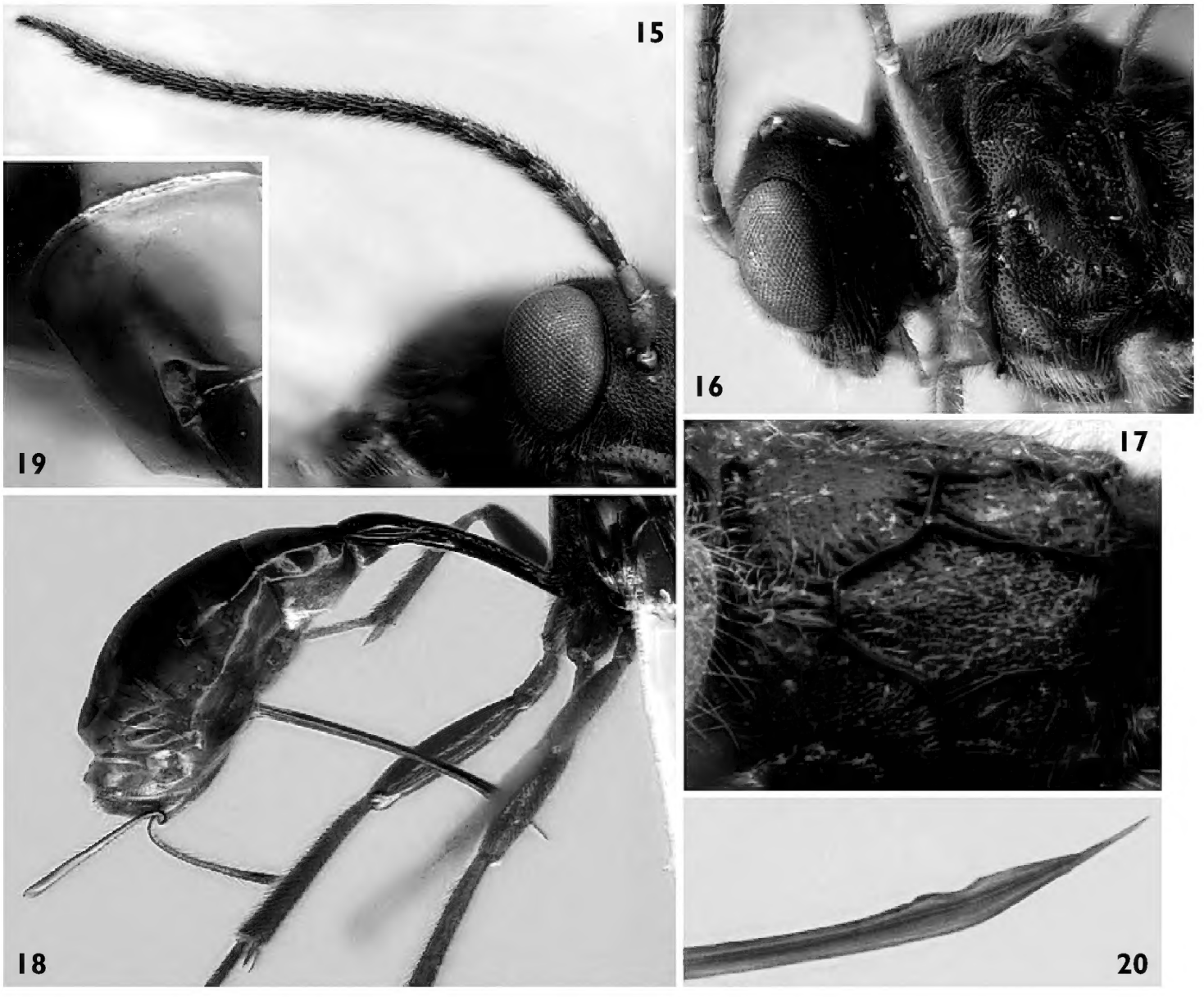
First tergite length 0.98 mm, posterior width 0.26 mm; tergite slender, weakly arched (Fig. 18), smooth; petiole very finely striate dorso-posteriorly and laterally in front of glymma. Glymma in anterior 0.6 of first tergite, medium-sized, joined by a distinct furrow to ventral part of postpetiole. Thyridia somewhat elongate (Fig. 19). Second tergite length 0.42 mm. Ovipositor upcurved, with two rounded, dorsal, subapical teeth and with one small ventral tooth (Figs 6, 20); sheath 0.8 mm long, 0.82 times as long as first tergite (Fig. 18).

Coloration. Body black. Palpi, mandible (excepting teeth) and legs yellow-brown (hind tarsus infuscate). Clypeus in its lower 0.4 and tegula brownish. Scape and pedicel of antenna yellowish. Pterostigma dark brown. Metasoma behind first segment yellow-brown, tergites 2-5 extensively blackish dorsally.

Male unknown.

Type material. Holotype female, China, Ningxia Hui Autonomous Region, Liupanshan, 35°24' N, 106°23' E, 1820 m, 11.VIII.2005, coll. M.-L. Sheng (GSFPM).

Etymology. From the Latin vulnificus (wounding).



Figures 15-20. *Probles vulnificus* sp. n., ♀, holotype. **15** antenna, anterior view; **16** head and anterior part of mesosoma, lateral view; **17** propodeum, dorsal view; **18** metasoma, lateral view; **19** tergite 2 with thyridium, dorsal view; **20** apex of ovipositor, lateral view.

***Probles (Microdiaparsis) caudiculatus* Khalaim, 2007**

Distribution. Transpalaearctic species: Europe, Caucasus, Russian Siberia and Far East, Mongolia, China (Ningxia, 35°24' N, 106°23' E, 1820 m).

***Probles (Microdiaparsis) temulentus* Khalaim, 2007**

Distribution. China (Qunghai, 33°35' N, 96°20').

***Probles (Rugodiaparsis)* sp.**

Material examined. China, Ningxia Hui Autonomous Region, Liupanshan, 35°24' N, 106°23' E, 1820 m, 21.VII.2005, coll. M.-L. Sheng, 1 ♂. First record of subgenus from China.

***Tersilochus (Pectinolochus) bulyuki* Khalaim, 2007**

Distribution. Mongolia, China (Inner Mongolia).

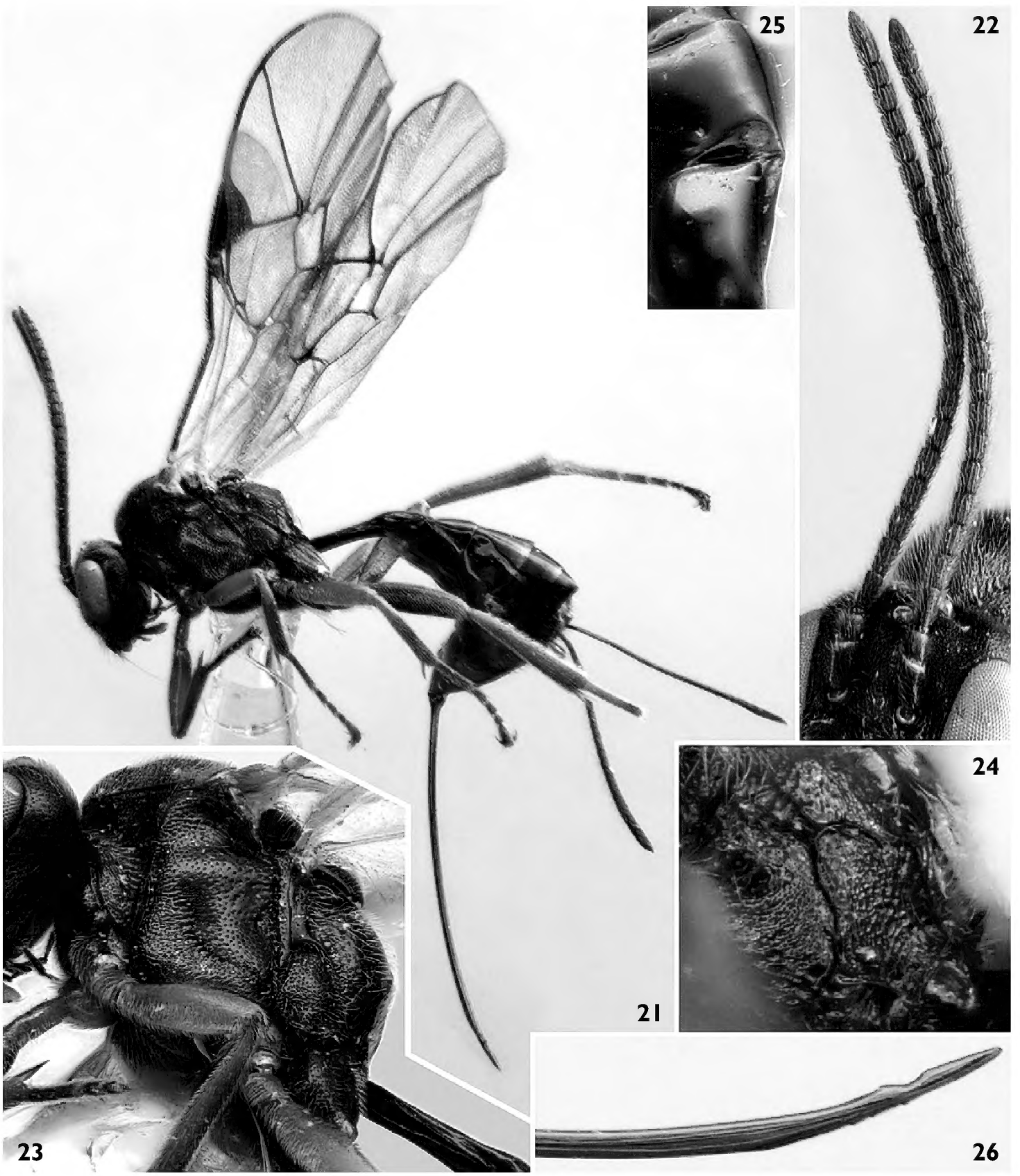
***Tersilochus (Tersilochus) ningxiator* Khalaim & Sheng, sp. n.**
urn:lsid:zoobank.org:act:186EA92B-0E56-4746-B7F4-8418E75013F0
Figs 7, 8, 21-26

Diagnosis. The new species belongs to the "cognatus" species group (correct name for the "jocator" species group according to Horstmann 2005) as the ovipositor has two dorsal teeth (Figs 8, 26), and resembles the European *T. petiolaris* Horstmann in the smooth first tergite, slightly elongate thyridia (Fig. 25), antenna with 20 flagellomeres (Fig. 22), and ovipositor sheath 1.8 times as long as the first tergite (Fig. 21). *T. ningxiator* sp. n. may be distinguished from this species by the well-developed sternaulus (Fig. 23), the mesopleuron smooth and distinctly punctate above sternaulus (Fig. 23), and the metasoma darker (Fig. 21).

Description. Female. Body length 3.9 mm.

Head roundly narrowed behind eyes in dorsal view (Fig. 7), temple 0.86 times as long as eye width (Fig. 7). Flagellum of antenna with 20 segments; middle flagellomeres 1.4, subapical flagellomeres 1.2 times as long as wide (Fig. 22). Upper tooth of mandible longer than lower tooth. Malar space 0.8 times as long as basal width of mandible. Clypeus broad, coriaceous and indistinctly punctate in its upper 3/4, and smooth in its lower 1/4. Face and frons densely granulate and more or less distinctly punctate. Vertex with shallow granulation and indistinct punctures. Temple finely granulate to almost smooth, partly finely punctate.

Mesoscutum densely granulate and finely and densely punctate. Sternaulus well-developed, rather long, upcurved anteriorly, with transverse wrinkles below (Fig. 23). Mesopleuron above sternaulus finely but distinctly and moderately densely punctate, mostly smooth between punctures (Fig. 23). Mesosternum smooth and densely punctate. Propodeum with spiracle adjacent to pleural carina; dorsolateral area finely punctate, smooth anteriorly and granulate posteriorly; apical area uneven. Basal area narrow, weakly widened anteriorly, more than twice as long as wide, and about half as long as apical area (Fig. 24).



Figures 21-26. *Tersilochus ningxiator* sp. n., ♀, holotype. **21** general habitus, lateral view; **22** antennae, latero-anterior view; **23** mesosoma, lateral view; **24** propodeum, dorso-lateral view; **25** tergite 2 with thyridium, dorsal view; **26** apex of ovipositor, lateral view.

Fore wing length 3.6 mm. First section of radial vein longer than width of pterostigma. Metacarp somewhat short of apex of fore wing. Second recurrent vein postfurcal, unpigmented in anterior part. Nervellus of hind wing weakly reclivous. Tarsal claws not pectinate.

First tergite length 0.96, posterior width 0.33 mm; tergite entirely smooth, moderately slender. Glymma in anterior 0.55 of first tergite, medium-sized, joined by a distinct furrow to ventral part of postpetiole. Thyridia distinct, slightly elongate (Fig. 25). Second tergite length 0.33 mm. Ovipositor upcurved, with two dorsal subapical teeth, finely denticulate ventrally (Figs 8, 26); sheath 1.75 mm long, about 1.8 times as long as first tergite (Fig. 21).

Coloration. Body black. Mandible (excepting teeth) brownish yellow. Clypeus with narrow brownish band along its lower margin. Tegula yellow-brown. Pterostigma brown. Metasoma behind first segment yellow-brown ventrally to black dorsally. Fore and mid legs with coxae for the greater part darkened, yellowish ventrally, femora yellow-brown, and tibia yellow-brown ventrally and infuscate dorsally. Hind leg with coxa entirely black, femur brown on inner surface and dark brown on outer surface, tibia brownish fuscous, basitarsus brownish basally to infuscate apically. All tarsi infuscate, but some tarsomeres narrowly brownish basally and apically.

Male unknown.

Type material. Holotype female, China, Ningxia Hui Autonomous Region, Liupanshan, 35°24' N, 106°23' E, 1820 m, 11.VIII.2005, coll. M.-L. Sheng (GSFPM).

Etymology. From the type locality.

Tersilochus (Tersilochus) orientalis Uchida, 1942

Distribution. East and south of China (Liaoning) (Uchida 1942), (Fujian) (Chao 1976).

Tersilochus (Tersilochus) runatus Khalaim & Sheng, sp. n.

urn:lsid:zoobank.org:act:C4F89746-9751-4EC9-8D56-5B7AEC56AEC1

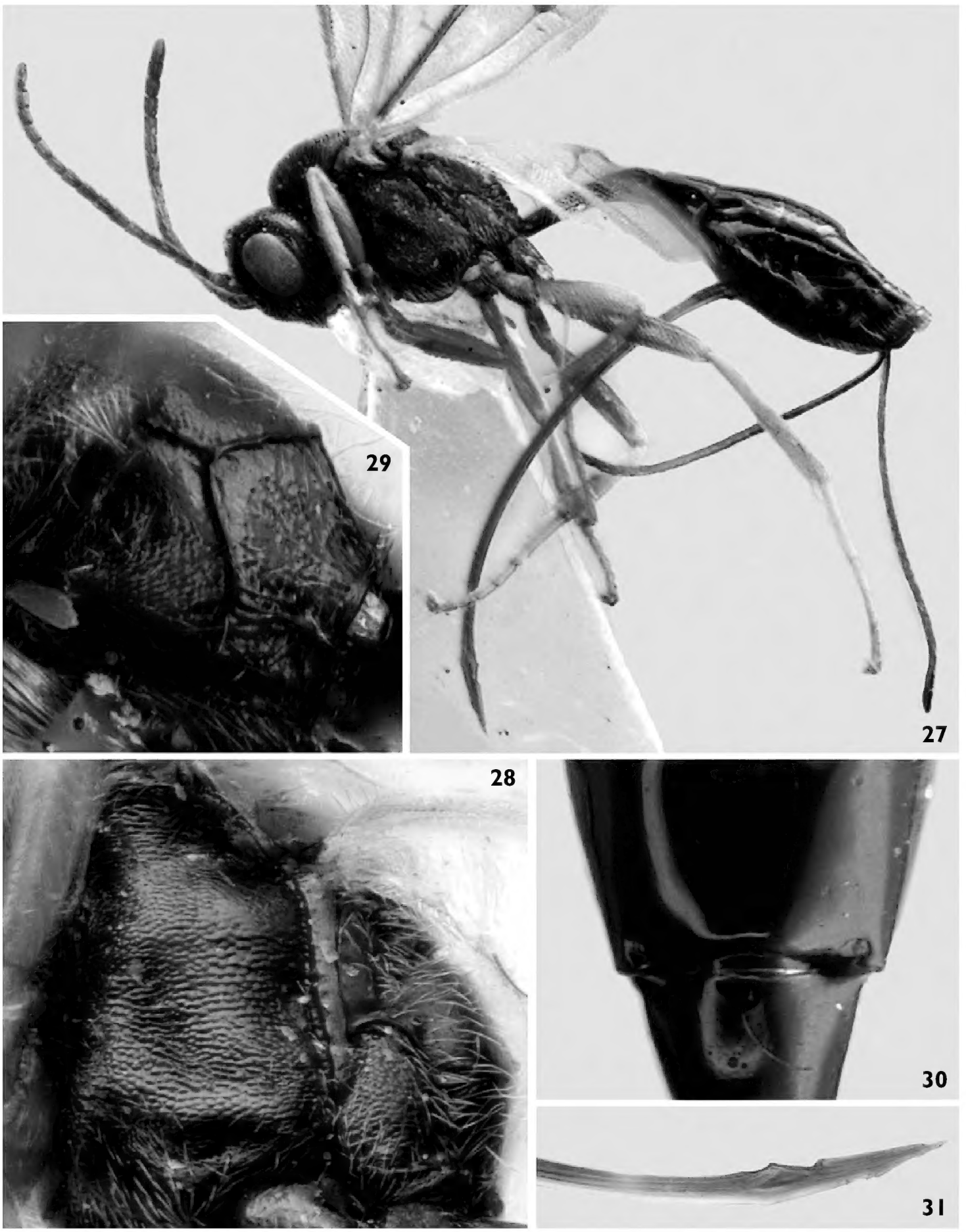
Figs 9, 10, 27-31

Diagnosis. The new species belongs to the "cognatus" species group (correct name for the "jocator" species group according to Horstmann 2005) as the ovipositor has two dorsal teeth (Fig. 10), differing from the European *T. fulvipes* Gravenhorst by the flagellum with 15-16 segments (24 segments in *T. fulvipes*), the longer flagellomeres, and the propodeum with basal keel (Fig. 29) (with basal area in *T. fulvipes*).

Description. Female. Body length 3.15 mm.

Head roundly narrowed behind eyes in dorsal view (Fig. 9), temple 0.9 times as long as eye width (Fig. 9). Flagellum of antenna with 15-16 segments, filiform; all flagellomeres, excepting the basal and apical ones, 1.4-1.6 times as long as wide. Upper tooth of mandible longer than lower tooth. Malar space somewhat shorter

than basal width of mandible. Clypeus very weakly convex, finely granulate upper 2/3, almost smooth in lower 1/3, with some sparse punctures. Face, frons and vertex granulate, impunctate. Temple finely granulate in upper part to almost smooth and shining in lower part.



Figures 27-31. *Tersilochus runatus* sp. n., ♀, holotype: **27** general habitus (without wings), lateral view; **28** mesosoma, lateral view **29** propodeum, dorso-lateral view **30** tergites 1-2, dorsal view **31** apex of ovipositor, lateral view.

Mesoscutum granulate, impunctate. Sternaulus as more densely granulate oblique area in anterior part of mesopleuron, with very fine transverse wrinkles (Fig. 28). Mesopleuron granulate to almost smooth and shining. Propodeum with basal keel almost half as long as apical area (Fig. 29). Propodeal spiracle separated from pleural carina by about one diameter of spiracle. Dorsolateral area of propodeum impunctate, indistinctly granulate, shining; apical area shining, almost smooth, but uneven (Fig. 29).

Fore wing length 2.8 mm. First section of radial vein longer than width of pterostigma. Metacarp not reaching apex of fore wing. Second recurrent postfurcal, unpigmented anterior part. Nervellus of hind wing weakly reclivous. Tarsal claws not pectinate.

First tergite length 0.67 mm, posterior width 0.26 mm; tergite smooth dorsally and laterally, slender. Glymma in anterior 0.6 of first tergite, medium-sized, joined by a distinct furrow to ventral part of postpetiole. Thyridia slightly transverse (Fig. 30). Second tergite length 0.28 mm. Ovipositor upcurved, with two strong, dorsal, subapical teeth, and distinctly denticulate ventrally (Figs 10, 31); sheath 1.6 mm long, about 2.4 times as long as first tergite (Fig. 27).

Coloration (Fig. 27). Body black. Palpi, mandible (except teeth), lower 1/3 of clypeus, tegula and legs (except black coxae and mainly brown hind femur) brownish yellow. Pterostigma brown. Metasoma behind first segment dark brown to black.

Male unknown.

Type material. Holotype female, China, Ningxia Hui Autonomous Region, Liupanshan, 35°24' N, 106°23' E, 1820 m, 30.VI.2005, coll. M.-L. Sheng (GSFPM).

Etymology. From the Latin runatus (armed with spear).

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